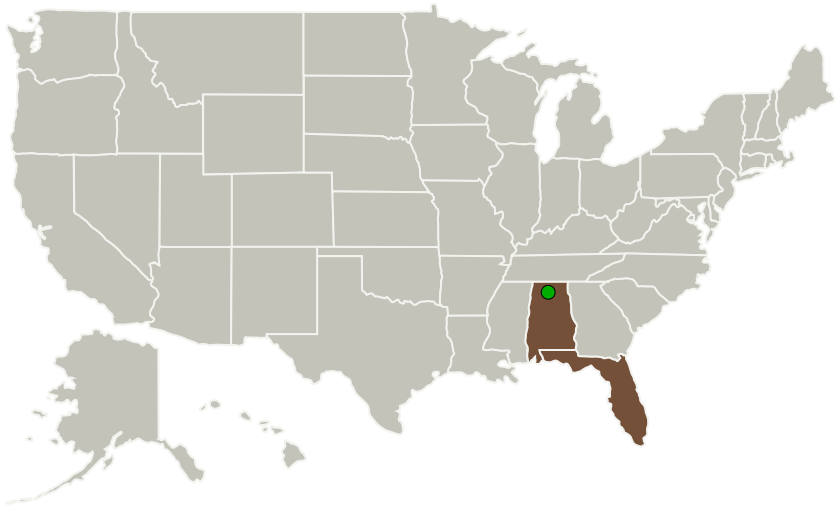
Seeing Sound - Image Analysis of the Lift-off Acoustic Field, Phase I

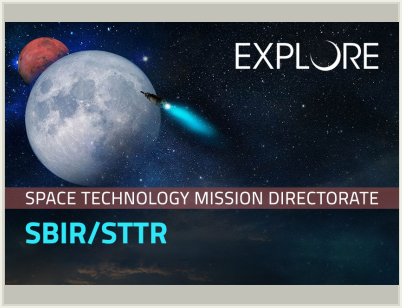
Completed Technology Project (2012 - 2012)

Project Introduction

A launch vehicle and its launch facilities are subjected to intense acoustic loads generated by the vehicle's propulsion system. The vehicle, its payload, and facilities must be designed to withstand these loads to ensure mission safety and success. Accurately accounting for the acoustic environment early in the design phase of a new launch vehicle is a high priority. Governments and aerospace entities expend significant resources investigating launch acoustics using a combination of predictive models, full-scale and subscale tests, and test flights. Sensors that acquire acoustic data are deployed over a limited geometry and do not sample the full three-dimensional volume exposed to the acoustic field. Launch imagery samples that three-dimensional volume. Under appropriate conditions, rapidly varying condensation features are generated by the lift-off acoustic field. A software tool will be developed to determine the three-dimensional structure of the field from imagery of these acoustically-induced features. This unique data will be compared to model predictions and will serve to either validate those models or inspire modifications to those models. Improving predictive models contributes to a more reliable and efficient design process for new launch vehicle propulsion systems, and thus reduces associated design costs. Techniques and procedures will be developed and evaluated during the Phase I effort and will be implemented into a software tool during the Phase II effort.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Leaping Catch, LLC	Lead Organization	Industry Women-Owned Small Business (WOSB)	Titusville, Florida
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Florida

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140333)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Leaping Catch, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Sandra Clements

Co-Investigator:

Sandra Clements

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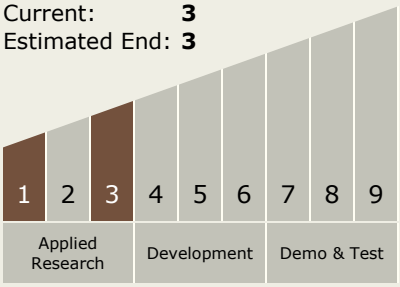
Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System